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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MORAN, TIMOTHY J

ART UNIT

PAPER NUMBER

2878

DATE MAILED: 08/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/844,171

Applicant(s)

SCHIMERT ET AL.

Examiner

Timothy J. Moran

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-9,13,16,18 and 28-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1,16,18 and 32-37 is/are allowed.
- 6) ☒ Claim(s) 2, 4-9, 13, 28-31, and 38-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4-6, 28, 30, and 38-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hornbeck, U. S. Patent No. 5,021,663 in view of Kimura, U. S. Patent No. 5,589,688. Regarding claim 4, Hornbeck describes (fig. 4a) an infrared detector apparatus comprising an amorphous silicon portion (150), first and second electrodes (148), and a third electrode (152) on a side opposite from the first and second electrodes. Regarding the limitation "having a structural configuration which is selected to provide ... a resistance which is selected

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substantially independently of said temperature coefficient of resistance," it is understood that the resistance of the configuration of Hornbeck is selected substantially due to the resistance of the amorphous silicon portion and the dimensions of the amorphous silicon portion and the electrodes. Therefore the configuration is understood to be selected substantially independently of the temperature coefficient of resistance. Hornbeck also teaches that the electrodes are in thermal communication with the amorphous silicon portion. Hornbeck does not teach that the electrodes are made from an alloy which includes aluminum and titanium. However, Kimura describes (fig. 2) an infrared radiation sensor with a thermally sensitive silicon portion (element 1) and electrodes (5) made from an alloy of aluminum and titanium (col. 6, lines 5-6 and col. 9, lines 44-48). Therefore it would have been obvious to one of ordinary skill in the art to provide for electrodes made from such an alloy in the apparatus of Hornbeck for the benefit of electrical connection to the thermally sensitive portion.

Regarding claims 5 and 38, Kimura does not specify a composition range for the aluminum-titanium alloy. However, since both are well known to be good conductors, it is considered reasonable to use an alloy which includes approximately equal amounts of aluminum and titanium. Therefore it would have been obvious to one of ordinary skill in the art to use such an alloy in the modified apparatus of Villain for the benefit of electrical connection to the thermally sensitive portion.

Regarding claim 6, Hornbeck teaches that the infrared detector includes an integrated circuit (fig. 2) and a membrane (fig. 4a). Regarding claim 6,

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Hornbeck teaches that the infrared detector includes an integrated circuit (fig. 2) and a membrane (fig. 4a).

Regarding claim 28, the methods described are inherently implied in the use of the apparatus of claim 4.

Regarding claim 30, Hornbeck teaches that the electrodes are in thermal communication with the amorphous silicon portion.

Regarding claim 39, Hornbeck describes an infrared detector apparatus comprising a plurality of detector elements which each include a thermally sensitive portion (150) and conducting structures (148) which is thermally coupled to the thermally sensitive portion, which absorbs thermal energy, and which transfers thermal energy to the thermally sensitive portion. Hornbeck does not teach that the structures are made from an alloy which includes aluminum and titanium. However, Kimura describes (fig. 2) an infrared radiation sensor with a thermally sensitive silicon portion (element 1) and electrodes (5) made from an alloy of aluminum and titanium (col. 6, lines 5-6 and col. 9, lines 44-48).

Therefore it would have been obvious to one of ordinary skill in the art to provide for electrodes made from such an alloy in the apparatus of Hornbeck for the benefit of electrical connection to the thermally sensitive portion. Regarding the limitation "transfers thermal energy to said thermally sensitive portion," the structures of Hornbeck and Kimura are both understood to be described by this limitation, regardless of the relative amount of thermal energy which is transferred.

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Regarding claim 40, Hornbeck describes the use of circuitry in the apparatus (see abstract).

Regarding claim 41, Hornbeck teaches that the detector element comprises a membrane supported in spaced relation to a substrate (fig. 4a).

Regarding claim 42, Hornbeck teaches the use of amorphous silicon (col. 2, lines 20-28).

Regarding claims 43-46, all limitations have been discussed above.

Regarding claims 47-54, the methods described are inherently implied in the use of the kinds of apparatus described in claims 39-46.

Claims 2, 7, 13, 29, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hornbeck and Kimura as applied to claim 4 above, and further in view of Villain, U. S. Patent No. 5,912,464. Regarding claim 2, Hornbeck does not teach the selection of doping levels to produce a selected temperature coefficient of resistance. However, such doping methods are well known in the art, including Villain (col. 8, lines 31-46). Therefore it would have been obvious to one of ordinary skill in the art to use such methods with the apparatus of Hornbeck for the advantage of optimizing detector performance.

Regarding claim 7, Hornbeck does not teach the use of a resonant cavity. However, Villain teaches that the integrated circuit has thereon a reflective surface (fig. 8A and 8B, element 21, col. 14, line 63-col. 15, line 3), wherein a distance between said reflective surface and said membrane is selected to form a resonant cavity (col. 10, lines 19-30, col. 11, lines 8-10, and col. 13, lines 54-

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58). Therefore it would have been obvious to one of ordinary skill in the art to use such methods in the apparatus of Hornbeck to increase sensitivity.

Regarding claim 13, Villain teaches (element 32, fig. 16, col. 16, lines 13-23) that first and second electrically insulating layers (silicon nitride) can be fabricated above (eleventh step) and below (adjacent to polyimide) the amorphous silicon layer and electrodes. Note that the limitation "substantially transparent to infrared radiation" is implied by the statement that the reflective surface below the membrane reflects a substantial amount of infrared radiation (col. 10, lines 19-30).

Regarding claim 29, the methods described are inherently implied in the use of the apparatus of claim 2.

Regarding claim 31, the methods described are inherently implied in the use of the apparatus of claim 7.

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hornbeck, Kimura, and Villain as applied to claim 7 above, and further in view of Agnese, U. S. Patent No. 5,825,029. Regarding claim 8, Hornbeck does not teach that the membrane has a plurality of openings. However, Agnese describes (fig. 3 and fig. 4) a infrared sensing apparatus comprising a membrane (12) comprising a thermally sensitive portion (16) in contact with electrodes (22 and 24, col. 3, lines 17-30), where the membrane has a plurality of openings for the advantage of better absorbing infrared radiation. Therefore it would have been obvious to one of ordinary skill in the art to provide for a plurality of

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openings in the membrane of Villain for the advantage of better absorbing infrared radiation.

Regarding claim 9, Agnese teaches that the spacing of the grid openings have a length equivalent to half the wavelength of interest (col. 5, lines 5-8), and that the distance between the membrane and the cavity bottom should be equal to one quarter of the wavelength of interest (col. 4, lines 3-7). Therefore it would have been obvious to provide for openings with a transverse dimension approximately twice the distance between the reflective surface and the membrane in the modified apparatus of Villain for the advantage of better absorbing infrared radiation.

Allowable Subject Matter

Claims 1, 16, 18, and 32-37 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: Claims 1 and 16 include limitations involving insulating portions which are not taught in the known prior art documents which describe amorphous silicon infrared detectors, such as Hornbeck.

Response to Arguments

In response to applicant's disagreement (page 14, first paragraph) with the statement for reasons for allowance included in the office action dated April 24, 2003, Examiner has written a new statement for reasons for allowance.

Applicant's arguments filed July 24, 2003 have been fully considered but they are not persuasive.

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In response to applicant's arguments (page 15, first two paragraphs) that the elements "5" described in Kimura are not electrodes, it is noted that the Merriam-Webster's Dictionary defines an electrode as "a conductor used to establish electrical contact with a nonmetallic part of a circuit." The element "5" in Kimura contacts such a nonmetallic material (2a, fig. 2, col. 7, lines 45-53), and is therefore understood to be an electrode.

In response to applicant's arguments (page 15, last paragraph and page 16, first two paragraphs, and page 19, first paragraph) that Kimura teaches away from the claim 4 limitations "first and second electrodes are made of a material which absorbs thermal energy" and "are sufficiently thin so they are substantially absorbing to infrared radiation," it is noted that the structures described in Kimura meet these limitations. It is acknowledged that Kimura teaches away from the use of such structures to absorb infrared radiation. However, the teachings of Kimura are considered sufficient to guide one of ordinary skill in the art to modify the invention of Hornbeck to include the structures, regardless of any teachings regarding radiation absorption by electrodes.

In response to applicant's arguments (page 16, last paragraph and page 17, first paragraph, and page 18, first paragraph) that Examiner has not described a motivation for combining the Hornbeck and Kimura references to arrive at the invention of claim 4, it is acknowledged that the mere fact that references can be combined does not render the resulting combination obvious. However, the electrodes of Hornbeck and Kimura are considered to be equivalent for the purpose of electrical connection, and the teachings of Kimura

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to substitute the alloy for the aluminum material are considered to be sufficient motivation to one of ordinary skill in the art to render the invention of claim 4 to be obvious. Note that an express suggestion to substitute one equivalent component for another is not necessary to render such substitution obvious (MPEP 2144.06).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy J. Moran whose telephone number is 703-305-0849. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 703-308-4852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

T.M.

TM
August 21, 2003


DAVID PORTA
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